Europe Explains "Relativity" at Last—With Movies

And Here Are the First Actual Reproductions from the Astonishing New Films Which May Make the Puzzling Einstein Theory as "Simple as A. B. C."

Cut-Out from Film Illustrating Optical Relativity. The Lighthouse and Ship Are Not Visible, One from the Other, but to an Outsider in Space Both Are Visible

EINSTEIN in the movies!

Not Izzy Einstein, the prohibition sleuth of many masquerades—but Albert Einstein, the famous mathematician, whose Theory of Relativity has created the greatest excitement the scientific world has known since Newton was bumped on the head by an apple!

Only a little while ago they were saying that there were only twelve highbrows on earth who could understand the meaning of Einstein's formula.

But now, according to word that has just come from Berlin, a successful effort has been made by some of his fellow-scientists to interpret it in terms of a popular educational movie!

"Cut-outs" from the film have been received in America, and some of them are reproduced, for the first time, on this page.

With the aid of these pictures, it is contended, certain fundamental aspects of the Einstein theory can be grasped by the average mind—even by the mind of a bright ten-year-old child.

This article is an effort at such a simplification, based on the movie pictures. Don't be afraid of it. You may not "get" it if you skim through it hurriedly in a street car or subway, but if you read it at home, as you would a chapter from a book, you may find it as simple and fascinating as a fairy-tale.

And when you do "get it" you can have the fun of "explaining" the Einstein theory to your less learned friends.

So here you go:

Relativity, to begin with, as it was understood even before Einstein, is simply the doctrine that knowledge about a particular thing is dependent upon the relation in which it stands to some other thing.

Take, for instance, a blade of grass. To you it is a small thing that helps make a carpet for your feet in Summer. But to a crawling ant a blade of grass is a great, tall tower, on which it may crawl up and survey the surrounding landscape. You say the blade of grass is small. The ant says the blade of grass is large. A complete paradox. Yet you are both right. A thing may be large and small at the same time. That is relativity.

Take, now, the first picture from the Einstein movie—the one that represents a section of the earth, with a ship and lighthouse. Imagine one observer in the lighthouse tower and another out at the side, in space, as you are when you look at the picture. The observer in the lighthouse says there is no ship in sight, and he is correct, for the ship is around a dip in the horizon, and he can't see it. You say there is a ship in sight, and you also are correct, for you see from a different angle.

Now look at the next strip of film—the flat landscape which shows a trench, an armored car moving in front of it, and six riflemen, numbered 1, 2, 3, 4, 5, 6.

The armored car is moving from right to left at an imaginary speed—exactly the same speed in which bullets fly from the rifles. As it comes exactly opposite rifleman No. 4 (middle panel) he fires a bullet. The bullet penetrates the near side of the car, as shown in the middle panel of the film. As the bullet goes through the interior of the car the car keeps moving at the same speed as the bullet, and at right angles to it, with the result that the bullet goes through the far side of the car at the point marked X, in the middle panel.

At this very instant the car comes to a complete stop, in the position shown in the bottom panel of the film. Military observers go out to inspect it and decide which rifleman has hit it. They do not know that the car kept moving after the bullet penetrated the near side. They take their instruments and draw a mathematical line through the two bullet holes as the car now stands. This line, indicated in white, points precisely to rifleman No. 6. Here is mathematical proof, they say, that rifleman No. 6 fired this bullet, and it is a well-known fact that mathematics never lie. So they pin a medal on rifleman No. 6. And in spite of their mathematics they are wrong, for it was really rifleman No. 4 who hit the car.

The lower strip—the ball dropping from a tower—takes you into a realm of relativity that is even more absolute, for it proves the amazing statement that a line can be absolutely straight, yet may also be curved. This is real "Einstein."

Here is a section of the earth, revolving in space from right to left. Observers in the tower are about to drop the ball and to calculate its exact path as it falls, with the finest scientific instruments.

Imagine yourself off in space, with another set of observers equipped with high-powered telescopes and equally fine scientific instruments for measurement of the line the ball makes when it falls.

You can see the ball fall, just as the people in the tower can—but what you can also see and what the people in the tower cannot see is the revolving movement of the earth which takes place while the ball is falling.

In the top panel the observers in the tower drop the ball. Impelled by gravitation it falls in an absolutely straight line to earth, along the dotted line, parallel at every moment with the tower itself. They have measured its movement and found the line absolutely straight.

Meanwhile, in the bottom panel, we have been making observations of the falling ball from our position out in space.

As the ball is falling the earth revolves a short distance from right to left, and the tower with it. So also does the ball—falling in a perfectly straight line with relation to the tower—and for this very reason, that it does tend to follow the tower and fall in a straight line with relation to it, the ball falls in a curved line with relation to our instruments out in space!

Study the dotted lines! It's amazing, but it's true! So this is relativity!

And what Professor Einstein has done is to apply this principle of relativity to the problems of physics, astronomy and higher mathematics.

He tells you that there may be a conceivable condition in which two and two do not make four—in which a straight line may not be the shortest distance between two points—in which two sides of a triangle may not be longer than its third side!

To explain this, he supposes a "fourth dimension" and "curved space." Do not be afraid of the phrases. You know what the three dimensions are—length, width and thickness. And you know what space is as conceived in these three dimensions. Einstein's contention is that space itself may be "curved" or "bent" on some gigantic scale, so that a line which travels "straight" by Euclidian geometry for a distance approaching infinity might eventually come back to the point from which it originally set out.

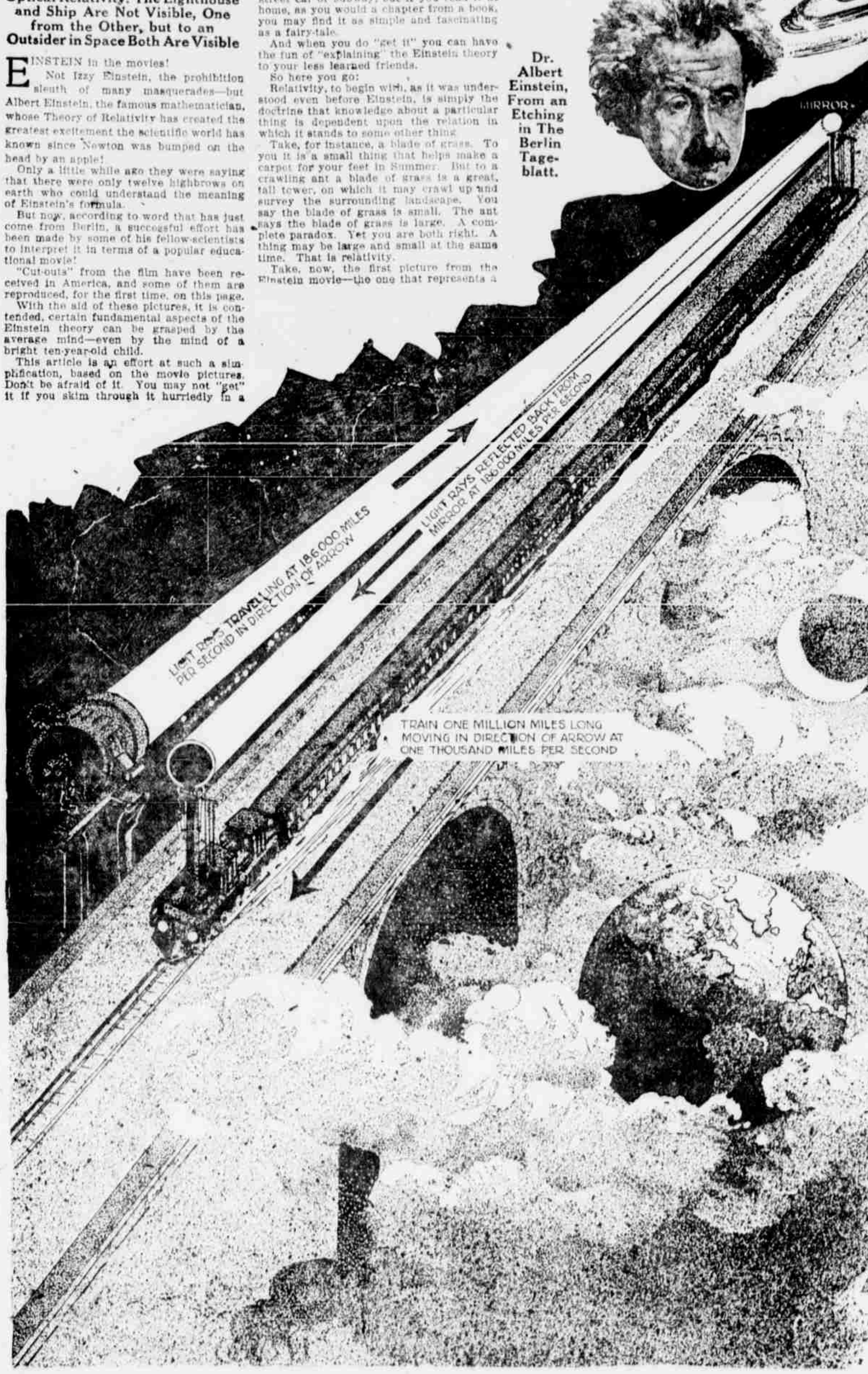
Still more extraordinary are Einstein's conclusions about the speed of light. All scientists know that light travels at the rate of 186,000 miles a second. Einstein's theory, according to some exponents, presents the amazing supposition that a ray of light will travel past an object which is itself moving rapidly either toward or away from it at exactly the same rate it would pass it if the object were standing still.

The large black-and-white drawing on this page illustrates this idea. It represents an immense railroad bridge stretching for billions of miles through infinite space. On it is an electric train speeding toward the reader at 1,000 miles per second. At each end of the train are two mirror reflectors, facing each other.

Fastened to the bridge is a searchlight. As the front end of the train passes the searchlight, the searchlight sends back a ray of light which strikes the rear mirror of the moving train. This rear mirror then throws the light forward to the front mirror. The front mirror, being on the moving train, is speeding away from the ray of light which is chasing it. You would expect that the reflected ray of light—the first flash which darted from the rear mirror the instant the searchlight first struck it—would, in order to reach the front mirror, have to travel the million-mile length of the train, PLUS the distance which the front mirror has been carried by the moving train during the time light takes to catch it. In other words, you would suppose, by the rules of physics, the ray would have to travel farther, and, therefore, have to take a longer time, because of the train's movement, than if the train had been standing still. But Einstein's theory, and certain actual experiments, seem to prove that the ray of light would take exactly the same time to make the journey as if the train were standing still!

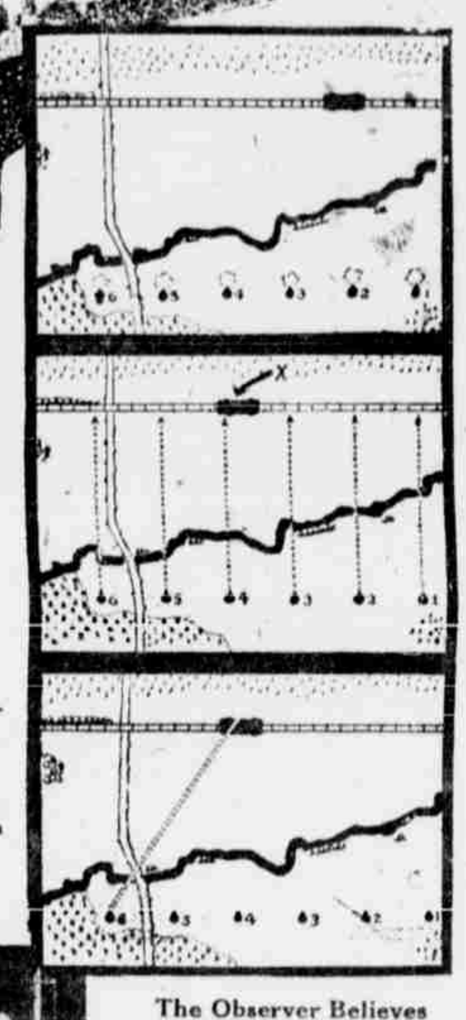
From this the extraordinary idea is deduced that "the speed of light between two bodies is not affected by the movements of either body." In other words, two planets may be moving toward each other or away from each other at an enormous rate of speed, yet the time it takes for light to travel between them is the same as if they were both standing still!

Is the Einstein theory true? Nobody knows. He doesn't know himself. But the world's greatest astronomers and mathematicians have discovered that it seems to work practically in certain cases, and therefore they believe it may be true and regard Einstein as one of the world's greatest living men.

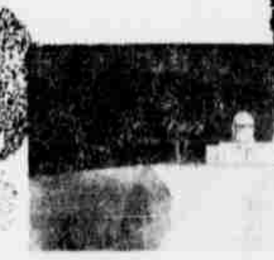


Dr. Albert Einstein, From an Etching in The Berlin Tageblatt.

This Imaginary Train, 1,000,000 Miles Long, Traveling at a Terrific Rate Through Space, Is Used to Ilustrate Einstein's Extraordinary Theories About the Speed and Properties of Light. A Fascinating and Complete Explanation Is Given on This Page.



These Two Falling Balls Illustrate the Strange Paradox That a Line May Be Both Straight and Curved at the Same Time.



The Observer Believes Rifleman No. 6 Has Fired the Shot Which Pierced Armored Car, but It Was Really Fired by Rifleman No. 4. An Example of Relativity Explained in the Article on This Page.